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ABSTRACT

This aid consists of three specially designed charts for determining the number of teaching stations required to house any given enrollment of pupils in any subject. Further uses are to determine class size, to discover the adequacy of proposed multi-purpose rooms, and to compute the fraction of a school day any room will be used. A specific example is used to familiarize the reader with the five steps used in the formula. An educational program is also presented to show how the formula is used in a realistic situation. (RH)

# THE CASTALDI NOMOGRAM

## An Aid for Translating the Curriculum of Junior and Senior High Schools into the Necessary Number of Instructional Spaces or Classrooms.

# THE CASTALDI NOMOGRAM

## AN AID FOR TRANSLATING THE CURRICULUM OF JUNIOR AND SENIOR HIGH SCHOOLS INTO THE NECESSARY NUMBER OF INSTRUCTIONAL SPACES OR CLASSROOMS

BASIL CASTALDI, ED. D.

Massachusetts School Building Assistance Commission



DECEMBER, 1953

The publication of the Castaldi Nomogram was approved by the Executive Committee of the Council. Each school committee member and superintendent of schools in a member school system will receive one copy without charge. Additional copies may be ordered from the Council office. They will be sold to member school systems and non-members as follows.

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NEW ENGLAND SCHOOL DEVELOPMENT COUNCIL
Spaulding House - 20 Oxford Street
Cambridge 38, Massachusetts

December, 1953

To Superintendents of NESDEC Member School Systems:

The New England School Development Council has a continuing interest in the problems of providing adequate school buildings and facilities. Previous NESDEC publications have dealt with the selection of sites, long range planning of school buildings and evaluating school buildings.

The Castaldi Nomogram, the 19th in the series of NESDEC publications is particularly relevant to the problems facing countless numbers of school administrators and laymen as they seek to provide adequately for an expanding junior and senior high school enrollment. This nomogram re-emphasizes the importance of planning a curriculum well in advance of erecting a building to house children. A scientific base is presented for determining one phase of advance planning, viz., the necessary number of teaching stations or classrooms in a planned secondary school.

NESDEC was quick to respond to the opportunity to make this publication available to school committee members and administrators of its 107 member school systems, all of whom are conscientiously seeking more adequate means of providing for the youth of their communities.

We believe that those who use this publication will agree with the Executive Committee of the New England School Development Council that Dr. Basil Castaldi has made a significant and practical contribution to the cause of better public schools.

T. Joseph McCook
Council Chairman

HERE ARE TYPICAL QUESTIONS TO WHICH

Superintendents

Principals

School Committee

and

Building Committee members can find answers by using the CASTALDI NOMOGRAM

Answers are based on 80% pupil utilization factor.

(1) How many teaching stations would be needed to teach science to 400 pupils taking science 4 times a week with an average class size of 25 in a school with a program organized on a six period day?

Answer from the Castaldi Nomogram: You would need 2.6 teaching stations or rooms.

(2) How large will the average class size be if four rooms are available for teaching science to 400 pupils taking the subject 5 times per week in a school organized on a six period day?

Answer from the Castaldi Nomogram: 21 pupils.

(3) Will one multi-science room be adequate for teaching general science to 90 pupils 3 times per week with an average class size of 30; biology to 52 pupils 5 times per week with an average class size of 25 and physics to 24 pupils 6 times per week with an average class size of 25 in a school organized on a 6 period day?

Answer from the Castaldi Nomogram: No: While one classroom would be required on a purely theoretical basis, practical scheduling problems will necessitate the availability of an extra classroom one or two periods per day for instruction in the sciences.

(4) What fraction of the school day will a science room be used for 200 pupils taking the subject 3 times per week with an average class size of 30 in a school organized on a six period day?

Answer from the Castaldi Nomogram: The science room will be used .8 of the school day.

# I INTRODUCTION

It is highly essential that the curriculum be given serious consideration in the planning of a secondary school building long before an architect is requested to draw even preliminary sketches of the proposed building. One of the most important duties of the superintendent of schools and the board of education is to make available to the architect a detailed schedule of spaces required to house a curriculum which is designed to meet the educational needs of the pupils in their community.

The responsibility for answering questions pertaining to the educational efficiency of a proposed school building rests solely with the persons entrusted with the educational planning of the school and should not be delegated to the architect. Unless the educational program is given primary attention in the initial stages of the planning, the curriculum may be determined by the spaces in the building, rather than by the educational needs of the community.

It can be seen, therefore, that good school building planning starts, not with the hiring of an architect, not with the selection of a school site, but rather, with a careful evaluation of the present curriculum by the school board, by the school officials, by the parents, by interested citizens, by potential employers of the graduates of the school, and by the pupils themselves. This study should result in the ultimate adoption by the school board of a curriculum designed to meet the needs of the pupils in a specific community.

Many school boards follow the practice of planning their school building like one of a similar capacity located in "X" community. This procedure is unwise for two reasons. First, the educational needs of pupils in one community are not necessarily the same as those in "X" community. Also, the school board may be ignoring an excellent opportunity to bring its existing curriculum up-to-date. The most propitious time for considering curriculum improvement is during the planning stages of a new building when the community is more apt to be "education-conscious." When it is also realized that today's poorly planned school building tends to "freeze" the curriculum for the next fifty to seventy-five years, it becomes quite obvious that any new school building should be planned to meet the space requirements of a modern, up-to-date educational program and also be designed to accommodate any curriculum changes in the foreseeable future.

Once the curriculum has been developed cooperatively by all concerned

and has been officially adopted by the school board, it becomes the task of the superintendent of schools and the school building committee or school board to translate the curriculum into the number, type, and size of spaces required for its implementation in the new secondary school building. It is at this point that the Castaldi Nomogram for Translating the Curriculum of Junior and Senior High Schools into the Necessary Number of Instructional Spaces or Classrooms can be effectively utilized. The use of the Castaldi Nomogram insures that each building is tailor-made to fit the specific curriculum of any community.

## II

## THE CASTALDI NOMOGRAM

The Castaldi Nomogram is a tool or an aid for translating any specific educational program or curriculum into physical space requirements in a proposed secondary school building.

The Castaldi Nomogram consists of three specially designed charts for determining the number of teaching stations (rooms) required to house any given enrollment of pupils in any subject, if the number of teaching periods per week in the school program and the proposed class size and the number of periods each pupil attends that subject per week are known. For example, how many teaching stations (rooms) are required for 200 pupils electing general science if the subject is attended twice per week by each pupil, if the proposed class size is 25, and if the educational program of the school is thirty periods per week or 6 periods per day?

The Castaldi Nomogram may also be used for the following purposes: to determine class size, to discover the adequacy of proposed multi-purpose rooms and to compute the fraction of a school day rooms or a room will be used for any given subject or combination thereof under certain conditions. (See Appendices A, B, and C.)

Theory underlying the Castaldi Nomogram. The Castaldi Nomogram is based upon the following equation.

$$T = 1.25 \frac{E}{c} \cdot \frac{n}{N}$$

Where,

| | |
|---|---|
| T | Teaching stations |
| 1.25 | Factor related to a pupil station utilization of 80% |
| E | Enrollment in any subject |
| n | Number of times per week subject is attended per pupil |
| N | Total number of teaching periods per week in the educational program. |
| c | Proposed class size |

## Definition of Terms

Teaching Station. A teaching station is an instructional space for one teacher. One teaching station usually consists of a single room used for instructional purposes. However, large spaces may provide two or more teaching stations. For example, one gymnasium may be divided into two teaching areas (two teaching stations) by a movable partition.

Pupil station utilization factor. Pupil station utilization factor is the average of all the ratios obtained by dividing the total number of pupils receiving instruction in the school each period by the total number of available pupil stations in all instructional spaces in the building including the gymnasium, but excluding such spaces as the library, auditorium, cafeteria, student activity room and study hall, taken over one complete schedule cycle, usually one week. A pupil station utilization factor of 80% is used in the above formula and is satisfactory for secondary schools with enrollments ranging from 500 to 1400 pupils. A correction should be applied for enrollments of less than 400 and more than 1500. This matter will be discussed in section V.

Enrollment. Enrollment refers to the total number of pupils registered or anticipated in any given subject.

Class size. Class size is simply the proposed average class size for the subject under consideration.

Periods attended per week. Periods attended per week pertains to the number of periods per week that a pupil attends the subject under consideration. For example, a pupil taking physical education one double period each week would be rated as attending physical education classes 2 periods per week.

Total number of periods in the educational program. The total number of periods in the educational program is actually the number of instructional periods per week in the school program. In other words, an educational program organized on the basis of a six-period day would be 30 periods per week, while one organized on a seven-period day would be a program of 35 periods per week.

## III. HOW TO USE THE CASTALDI NOMOGRAM.

In order to familiarize the reader with the 5 steps involved in the use of the Castaldi Nomogram for determining the required number of teaching stations, a specific example will be used to illustrate each step.

Material needed. Three Castaldi Nomograms for programs of 25, 30, or 35 instructional periods per week are bound into the center of this report. For convenience in use they should be removed. In addition to the nomograms, a straight edge about 12 inches in length is required, preferably one that is transparent.

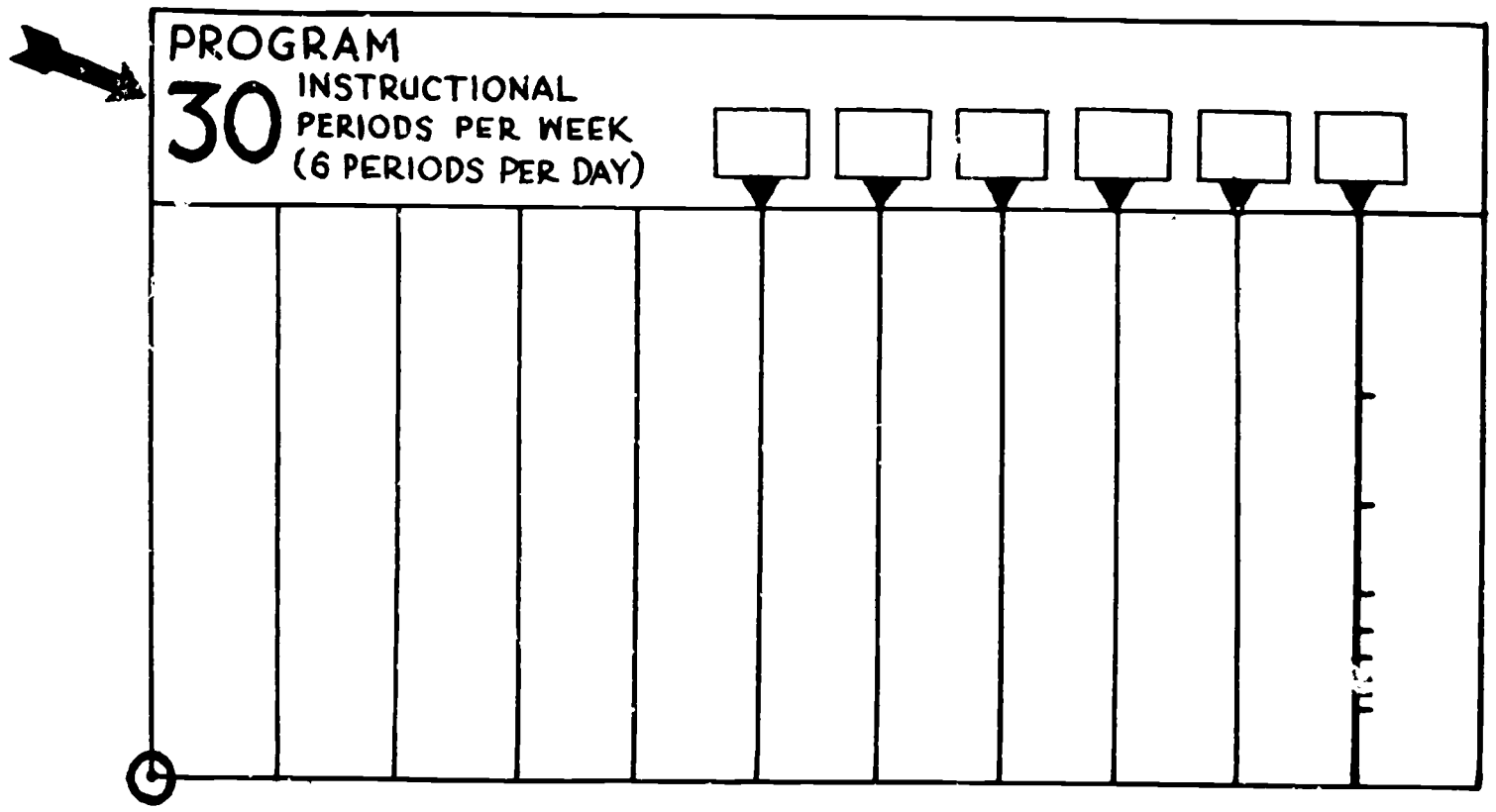
Example. How many teaching stations will be required for the teaching of general science in the seventh and eighth grades of a junior high school in the following situation?

| | | |
|---|---|---|
| a. | Anticipated enrollment in the subject | 200 |
| b. | Periods per week general science is attended per pupil | 2 |
| c. | Proposed class size | 25 |
| d. | Total instructional periods per week (6 period day) | 30 |

Step 1

Select the nomogram corresponding to the educational program of the school in question (see upper left hand corner of the nomogram.)

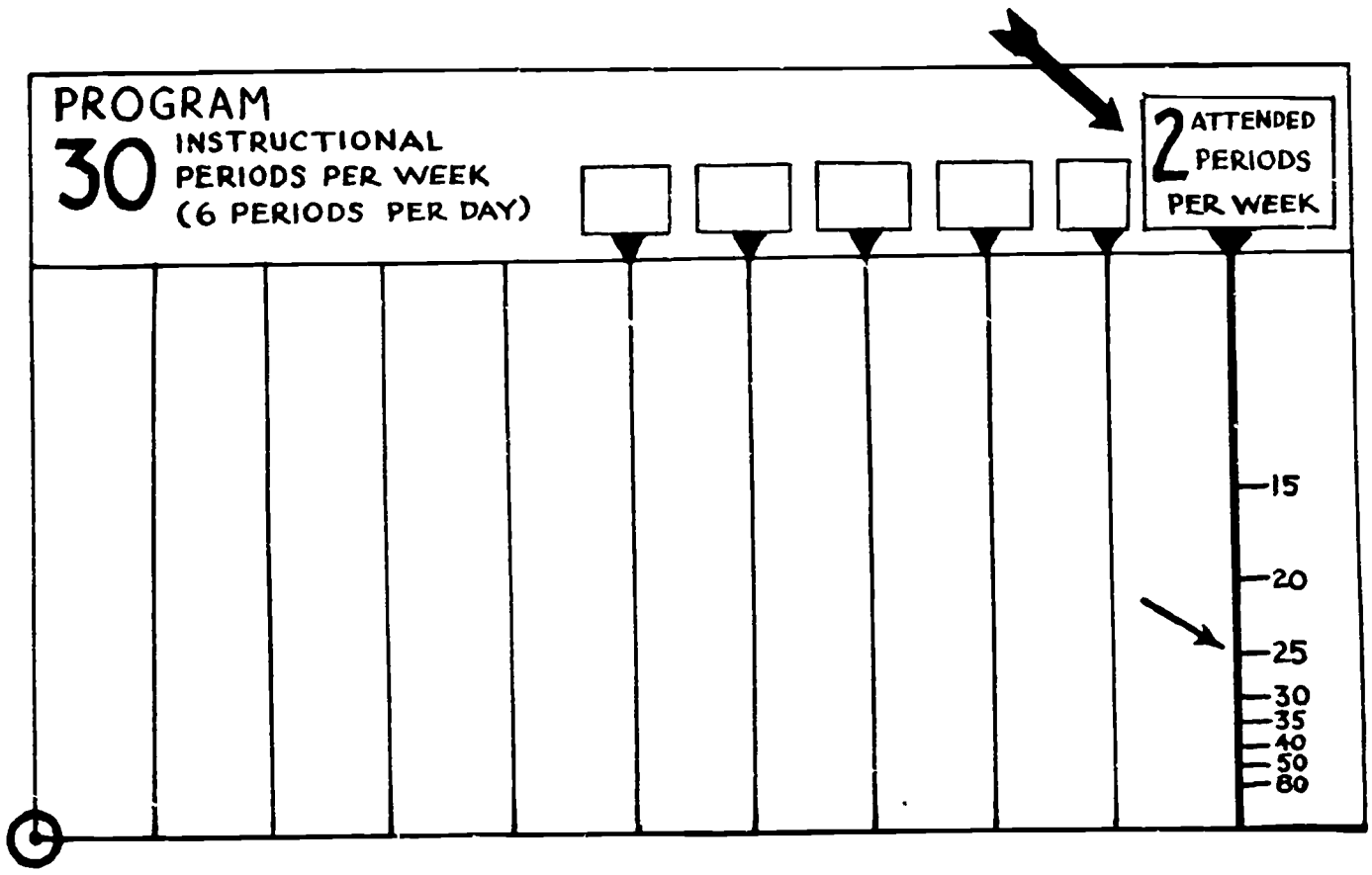
Example: 30 periods per week



Step 2

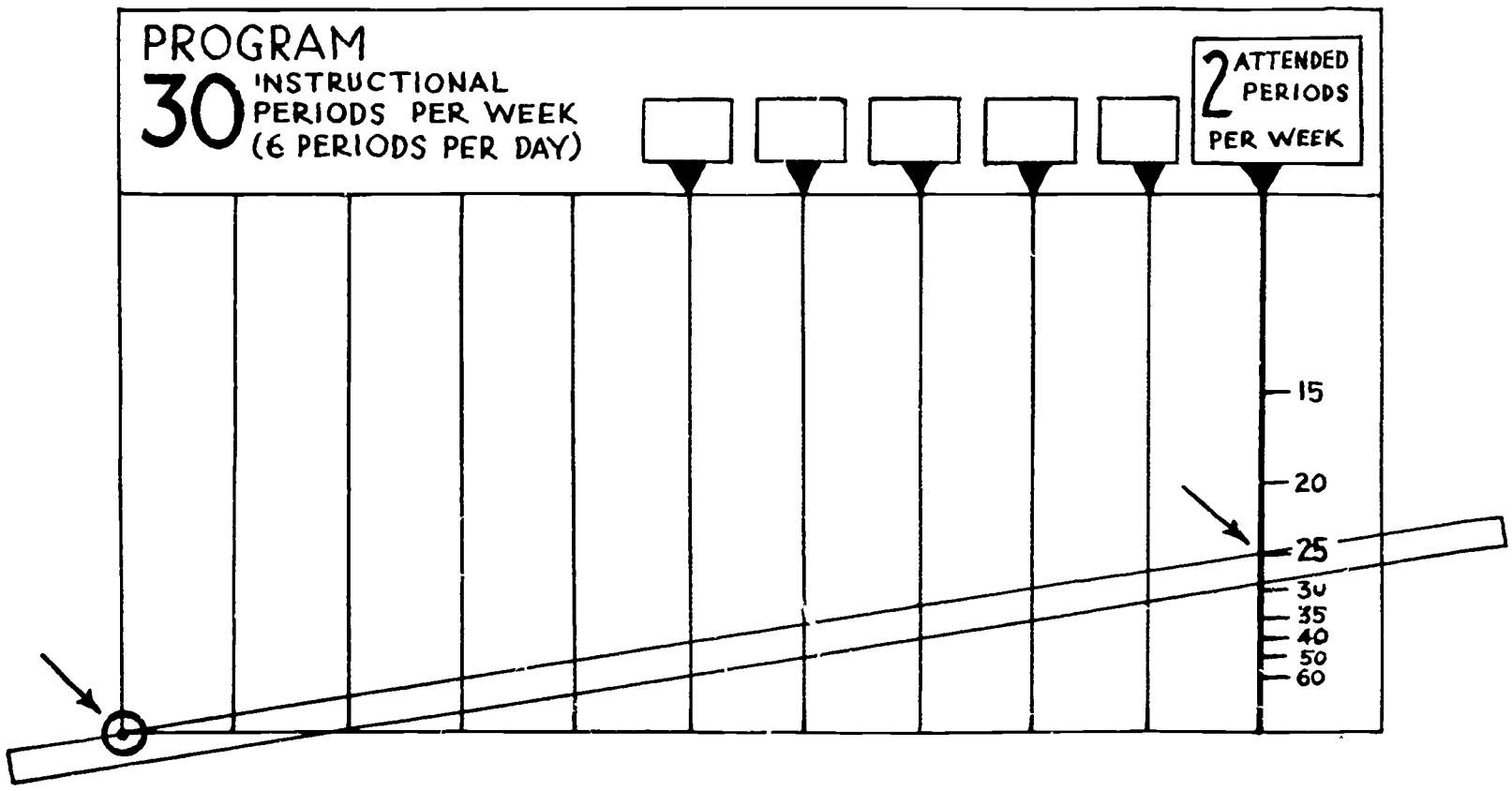
Find the vertical line corresponding to the number of times per week the subject is attended per pupil and locate the point corresponding to the desired class size indicated on this line.

Example: attended 2 periods per week
class size 25



Step 3

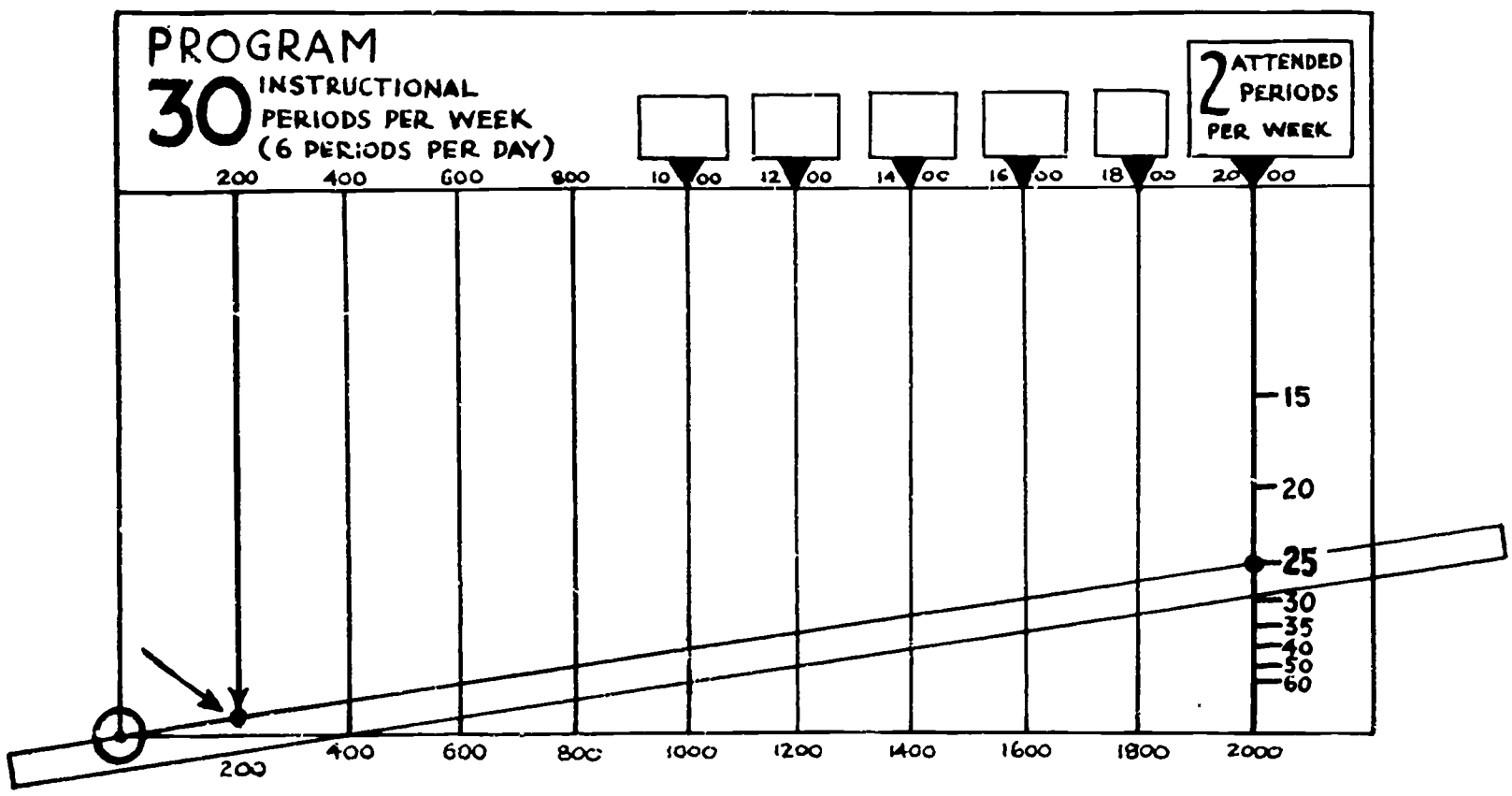
Place a transparent straight-edge so that it is aligned with the center of the circle marked "0" at the lower left hand corner of the chart and the point found in step 2 above.



Step 4

With the straight edge in this position, find the line indicating the desired enrollment either along the top or the bottom of the nomogram and follow it to the aligned edge of the straight edge.

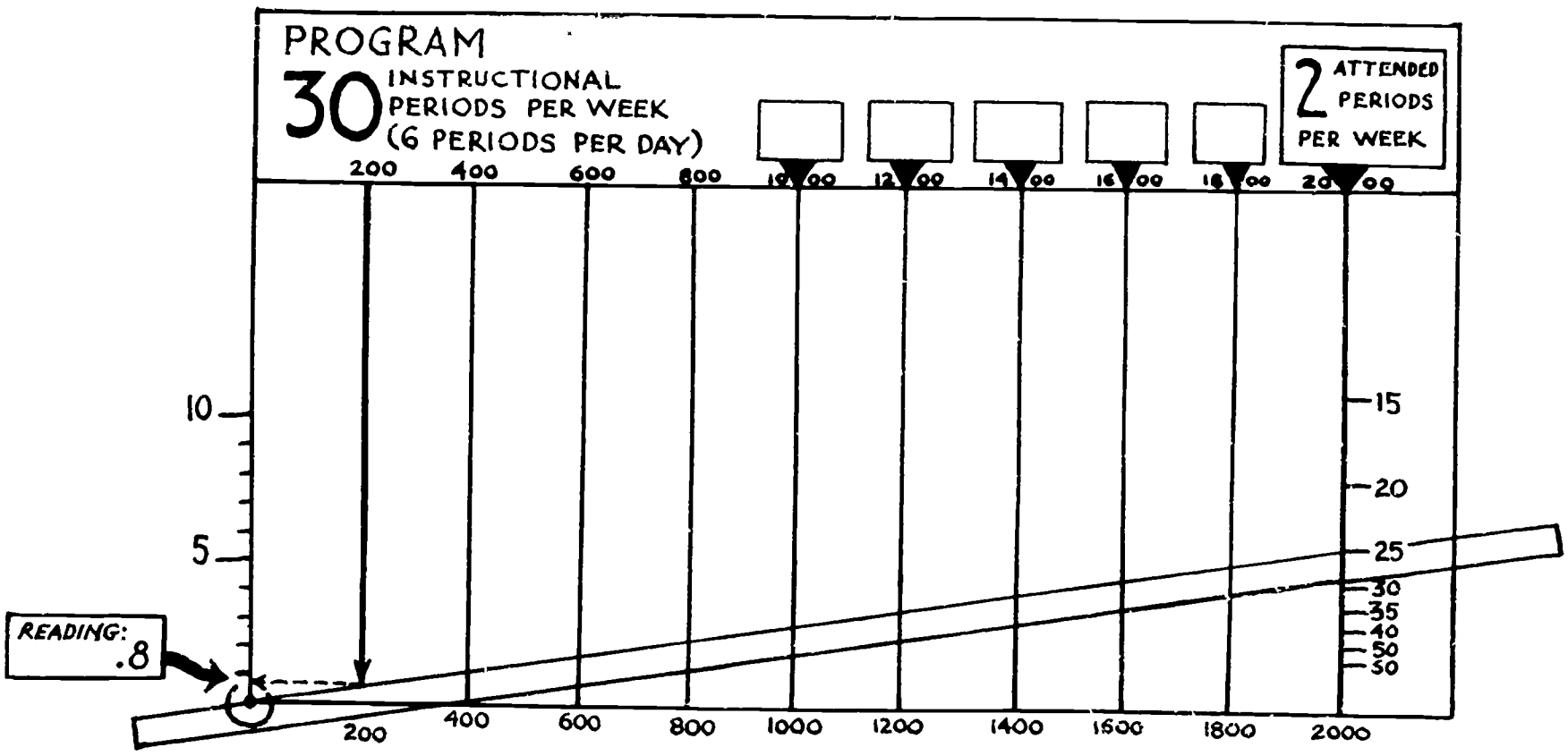
Example: Enrollment in subject 200.



Step 5

From this point on the edge of the straight edge, glance horizontally to the left edge of the diagram and read the number of teaching stations required.

Example: Number of required teaching stations is .8.
(Taken from nomogram)




To determine required spaces for subjects attended 1, 6, and 8 times per week.

1. To determine space requirements for subjects attended once per week, read the number of teaching stations from the chart for subjects attended two periods per week and divide this reading by two.

2. To determine space requirements for subjects attended 6 times per week, multiply the reading on the chart for subjects attended 3 times per week

by two.

3. To determine space requirements for subjects attended 8 times per week, multiply the reading on the chart for subjects attended 4 times per week by two.

## V. EXAMPLE ILLUSTRATING THE USE OF THE CASTALDI NOMOGRAM

The following educational program has been adopted by the school board upon the recommendation of the superintendent of schools, after the curriculum needs of the pupils in the community have been studied cooperatively by the school board, by school officials, by teachers, by parents groups, by the pupils, by the citizens and by other interested groups.

Example

Town "X"

Type of secondary school - junior-senior high school

Grades to be accommodated - 7-12

Program organized on a 6 period day
(core curriculum for grades 7-9) - 30 periods per week

Total anticipated enrollment - 800

# AN EXAMPLE OF A PROPOSED EDUCATIONAL PROGRAM (For a Junior - Senior High School)

| (1) Subject | (2) Anticipated Enrollment | (3) Subject Periods[1] Per Week | (4) Proposed Class Size | (5) Teach. Sta. Req. From Nomogram | (6) Total[2] Number of Spaces Needed |
|---|---|---|---|---|---|
| **ART** | | | | | |
| General Art 7th & 8th | 300 | 2 | 25 | 1.0 | |
| Arts and Crafts | | | | | (2) |
| Other Design | 60 | 5 | 25 | .5 | |
| **COMMERCIAL EDUCATION** | | | | | |
| Office Machines | 30 | 5 | 25 | .2 | |
| Office Practice | | | | | (1) |
| Typing | 150 | 5 | 35 | .8 | |
| Other | | | | | |
| Other | | | | | |
| Bookkeeping | 100 | 5 | 30 | .7 | .7 |
| Bus. English | | | | | |
| Bus. Math | | | | | |
| Stenography | 125 | 5 | 25 | 1.0 | 1.0 |
| Other Salesmanship | 35 | 5 | 30 | .2 | .2 |
| Other | | | | | |
| **HOMEMAKING** | | | | | |
| General 7th & 8th | 150 | 2 | 24 | .6 | |
| General Other Grades | 100 | 4 | 24 | .7 | (2) |
| Advanced | 20 | 6 | 24 | .3 | |
| Child Care | | | | | |

1. Number of periods per week that the subject is attended per pupil.
2. Encircled figure denotes combined activities in specialized rooms.

| Subject | Anticipated Enrollment | Subject[1] Periods Per Week | Proposed Class Size | Teaching Stations Req. From Nomogram | Total Number of Spaces Needed[2] |
|---|---|---|---|---|---|
| Other_____ | | | | | |
| Other_____ | | | | | |
| INDUSTRIAL ARTS (NON-VOCATIONAL) | | | | | |
| Electrical Work | | | | | |
| Gen. Shop, 7th & 8th | 150 | 2 | 20 | .6 | |
| Planning and Mechanical Drawing 7th & 8th | 150 | 1 | 25 | .3 | |
| Mechanical Drawing other grades | 40 | 5 | 25 | .3 | 1 |
| Shop-Other Grades | 80 | 4 | 20 | .6 | 1 |
| MUSIC | | | | | |
| Appreciation 7th & 8th Grades | 300 | 1 | 30 | .4 | |
| Band | | | | | |
| Chorus | | | | | 1 |
| Theory | 75 | 6 | 30 | .5 | |
| Other_____ | | | | | |
| PHYSICAL EDUCATION | | | | | |
| Physical Education | 800 | 2 | 40 | 1.6 | 2 |
| Health | | | | | |
| Other_____ | | | | | |
| PHYSICAL SCIENCES | | | | | |
| Biology | 100 | 5 | 25 | .8 | 1 |
| Chem. (See Physics) | 70 | 5 | 25 | .7 | |
| Gen. Science | 150 | 5 | 30 | 1.0 | 1 |

# THE CASTALDI NOMOGRAM

For translating the curriculum of junior and senior high schools into the necessary number of instructional spaces or classrooms

These charts can best be preserved by inserting them into a plastic transparent jacket.

# CASTALDI
## NOMOGRAM FOR DETERMINING TEACHING STATIONS IN SCHOOL BUILDINGS

**PROGRAM**

25 INSTRUCTIONAL PERIODS PER WEEK (5 PERIODS PER DAY)

15 ATTENDED PERIODS PER WK. | 10 ATTENDED PERIODS PER WK. | 5 ATTENDED PERIODS PER WK. | 4 ATTENDED PERIODS PER WK. | 3 ATTENDED PERIODS PER WK. | 2 ATTENDED PERIODS PER WK.

TEACHING STATIONS

ENROLLMENT

CLASS SIZE

# CASTALDI

## NOMOGRAM FOR DETERMINING TEACHING STATIONS IN SCHOOL BUILDINGS

**PROGRAM**

30 INSTRUCTIONAL PERIODS PER WEEK (6 PERIODS PER DAY)

15 ATTENDED PERIODS PER WK.

10 ATTENDED PERIODS PER WK.

5 ATTENDED PERIODS PER WK.

4 ATTENDED PERIODS PER WK.

3 ATTENDED PERIODS PER WK.

2 ATTENDED PERIODS PER WK.

TEACHING STATIONS

ENROLLMENT

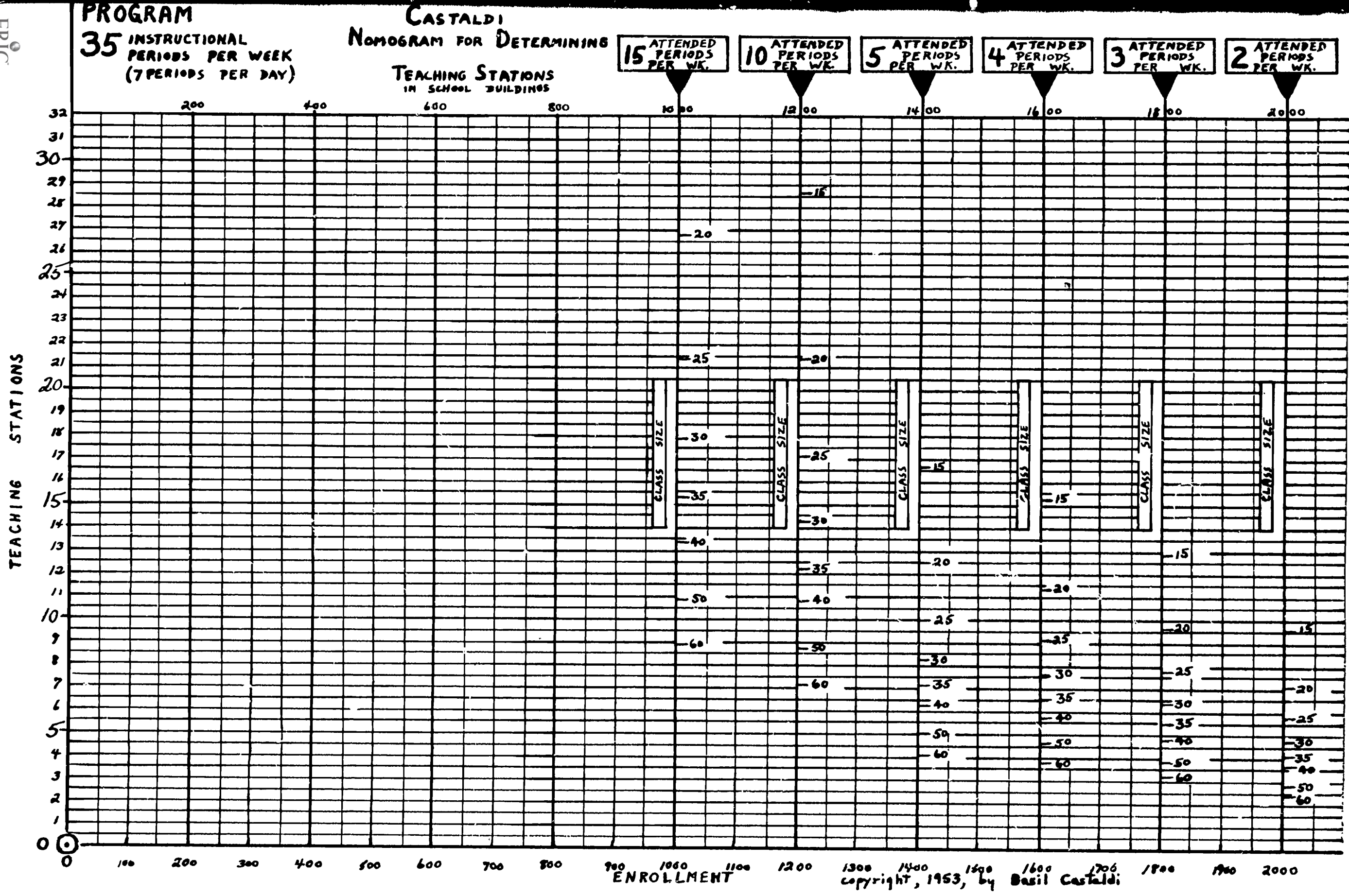
CLASS SIZE

# PROGRAM

35 INSTRUCTIONAL PERIODS PER WEEK (7 PERIODS PER DAY)

# CASTALDI

## NOMOGRAM FOR DETERMINING TEACHING STATIONS IN SCHOOL BUILDINGS



| Subject | Anticipated Enrollment | Subject Periods[1] Per Week | Proposed Class Size | Teaching Stations Req. From Nomogram | Total[2] Number of Spaces Needed |
|---|---|---|---|---|---|
| Physics- Chemistry | 50 | 5 | 25 | .4 | (1) |
| Other | | | | | |
| VOCATIONAL EDUCATION | | | | | |
| Agriculture | | | | | |
| Automotive | | | | | |
| Electricity | | | | | |
| Mechanical Drawing | | | | | |
| Metal Working | | | | | |
| Printing | | | | | |
| Radio-TV | | | | | |
| Woodworking | | | | | |
| Other | | | | | |
| CORE CURRICULUM, GENERAL EDUCATION, OR OTHER | | | | | |
| 7th Grade | 150 | 15 | 30 | 3.2 | (6) |
| 8th Grade | 150 | 10 | 30 | 2.1 | |
| 9th Grade | 150 | 5 | 30 | 1.0 | |
| 10th Grade | | | | | |
| 11th Grade | | | | | |
| 12th Grade | | | | | |
| 13th Grade | | | | | |
| 14th Grade | | | | | |
| ENGLISH | | | | | |
| 7th Grade | | | | | |
| 8th Grade | | | | | |
| 9th Grade | | | | | |
| 10th Grade | 500 | 5 | 30 | 3.5 | 3.5 |
| 11th Grade | | | | | |
| 12th Grade | | | | | |

| Subject | Anticipated Enrollment | Subject Periods[1] Per Week | Proposed Class Size | Teaching Stations Req. From Nomogram | Total Number[2] of Spaces Needed |
|---|---|---|---|---|---|
| 13th Grade | | | | | |
| 14th Grade | | | | | |
| Speech | | | | | |
| Journalism | | | | | |
| **LANGUAGES** | | | | | |
| French | | | | | |
| German | | | | | |
| Latin | 265 | 5 | 25 | 2.2 | 2.2 |
| Other_____ | | | | | |
| **MATHEMATICS** | | | | | |
| General Math | 150 | 5 | 25 | 1.2 | |
| Algebra (First Year) | | | | | |
| Algebra (Advanced) | | | | | 2.2 |
| Second Year Math. | 80 | 5 | 25 | .6 | |
| Advanced Math | 40 | 5 | 25 | .4 | |
| Other_____ | | | | | |
| **SOCIAL STUDIES** | | | | | |
| American History | | | | | |
| Civics | | | | | |
| Economics | | | | | |
| Geography | | | | | |
| Prob. of Democracy | 350 | 5 | 30 | 2.5 | 2.5 |
| Sociology | | | | | |
| World History | | | | | |
| Other_____ | | | | | |

## SUMMARY OF REQUIRED SPACES
As indicated on the
preceding example
(Column 6)

### SPECIALIZED SPACES

| Subject | No. of Spaces | Subject | No. of Spaces |
|---|---|---|---|
| Art | 2 | Music | 1 |
| Biology | 1 | Phys. Ed. | 2 |
| Chemistry-Physics | 1 | Science (Gen.) | 1 |
| Core curriculum | 6 | Typing-Office Mach. | 1 |
| Homemaking | 2 | Shop | 1 |
| Mech. Dr.-Planning | 1 | | |

### NON-SPECIALIZED SPACES

| Subject | No. of Spaces | Subject | No. of Spaces |
|---|---|---|---|
| Bookkeeping | .7 | Social Studies | 2.5 |
| English | 3.5 | Stenography | 1.0 |
| Languages | 2.2 | Salesmanship | .2 |
| Mathematics | 2.2 | | |

Total non-specialized spaces (inter-changeable classrooms) 12.3 or 13

## METHOD OF OBTAINING THE ABOVE SUMMARY

After the space requirement for each subject has been determined by using the Castaldi Nomogram, it should be recorded in column 5 to the closest tenth of a room. It is then necessary to "round off" the fractional classrooms into whole classrooms in the following manner.

Specialized spaces. The "rounding off" of specialized spaces should be done judiciously. The Castaldi Nomogram gives the exact number of spaces that are required for a specific program, a given enrollment and a definite average class size at an 80% pupil station utilization factor. Any reduction in space, therefore, will certainly result either in a curtailment of the proposed program of instruction in the field in question or result in an increased average class size or both when the building is in operation. These facts should be kept clearly in mind whenever space reductions are contemplated. Any "cut-back" in space means a "cut-back" in instruction.

Several approaches to the problem of "rounding off" specialized spaces are possible:

a. The combining technique. In small (less than 400 pupil enrollment) secondary schools, the "combining technique" is useful. If any activity requires less than half a teaching station, it can frequently be combined with a related activity. For example, typewriting and office machines may be taught in the same room. Or, if .3 space is needed for mechanical drawing and .6 space for general shop, it may be desirable and economical to give instruction in these two activities in a single expanded shop, with a glass partition between the mechanical drawing area and the rest of the shop. The mechanical drawing room, in this case, might also serve as a planning room for the pupils receiving shop instruction.

b. The program enrichment technique. Sometimes, the increment necessary to produce whole specialized spaces may be justified on the basis of program enrichment in the subject in question. For example, suppose that the Castaldi Nomogram indicates that 1.25 spaces are required for instruction in homemaking. If the proposed program provides homemaking only 2 periods per week, it is conceivable that the program could be enriched by offering homemaking to some girls (and boys) four times per week, in which case, 2 general homemaking rooms could be justified.

c. The space planning technique. In some instances it may be possible to plan a specialized space so that it will be adjacent to a non-specialized room that may be easily converted into a specialized instructional area if the need arises. For example, if 1.3 teaching stations are required for instruction in biology, it might be possible to locate a non-specialized room with adequate storage space and plumbing connections adjacent to one biology room. This arrangement of spaces provides necessary insurance against the curtailment of the educational program and adds to the flexibility of the secondary school building.

d. The ultimate anticipated enrollment technique. If there is any evidence indicating that the ultimate enrollment of the proposed school building will increase appreciably in the foreseeable future, fractional specialized spaces should be raised to the next whole number. For example, .6 would be raised to 1.0; 1.3 would be raised to 2.0; 3.5 would be raised to 4.0.

Non-specialized spaces. All non-specialized spaces should be totaled in decimal form as shown in the summary of required spaces before any "rounding-off" is accomplished. Total of all non-specialized rooms should be "rounded off" to the next higher whole number.

Correction for size of school. The space requirements determined by the use of the Castaldi Nomogram assumes a pupil station utilization factor of 80%. While this is valid over a wide range of enrollments, a correction should be made for very small and very large secondary schools. The correction should be made to each determination of space requirement in column 5 before it is "rounded off" as described above. For secondary schools planned for an enrollment of less than 400 pupils, add 10% to each determination in column 5. For schools having an enrollment greater than 1500 pupils, subtract 10% from each requirement in column 5.

The summary of required spaces lists all the instructional spaces that are necessary for the implementation of the proposed educational program. Further consideration should be given to other supplementary spaces, such as the auditorium, audio-visual room, library, cafeteria, student activity room, study hall (the cafeteria may be used for this purpose if it is properly designed), administrative spaces, guidance, health, and service spaces. The determination of the number and type of spaces, described in this publication, is the initial step in school building planning. The problems connected with the size of the required spaces, with the relationship of one space to another, and with the planning of the building as a functional and well-integrated unit are not within the scope of this publication. However, they should be solved by the planning groups before preliminary plans are drawn.

# APPENDIX A

## To Determine Class Size with the Castaldi Nomogram

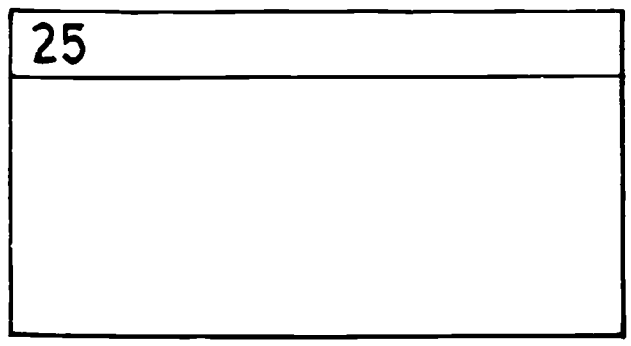
The Castaldi Nomogram may also be used to determine the class size that would result for any given enrollment of pupils in any subject if the number of teaching periods per week in the school program, the number of available teaching stations and the number of periods each pupils attends the subject per week are given. In other words, how large will the classes be if physical educaticn is attended four periods per week by each pupil of a school with an enrollment of 600, if only two teaching stations are available (one gymnasium with a movable partition), and if the educational program is organized on the basis of a 30 period week?

### Steps Involved in Determining Class Size

EXAMPLE: How large will the average class size be if 1000 pupils are taking physical education two periods (one double period) per week in a gymnasium divided into two sections (two teaching stations) by a movable partition? The school is organized on a 25 period week. Answer: 52 pupils per class.

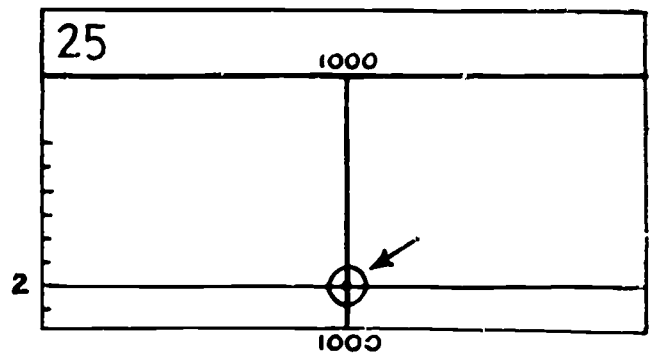
Step 1 Select the nomogram corresponding to the educational program of the school.

Example: Educational program, 25 instructional periods per week.

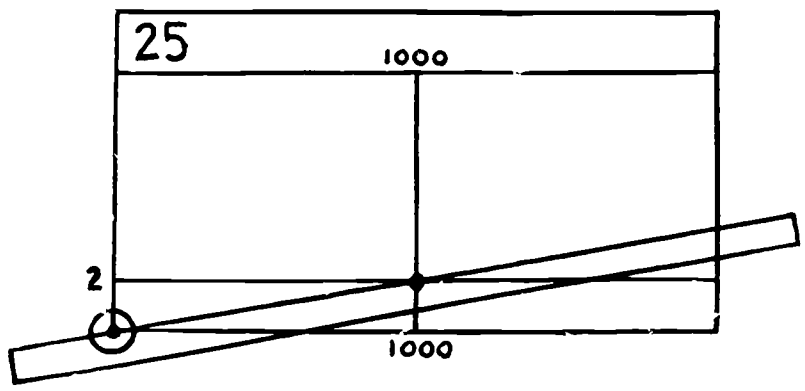


Step 2 Locate the point of intersection made by the line corresponding to the enrollment and the line corresponding to the available teaching stations.

Example: Enrollment, 1000; available teaching stations, 2.

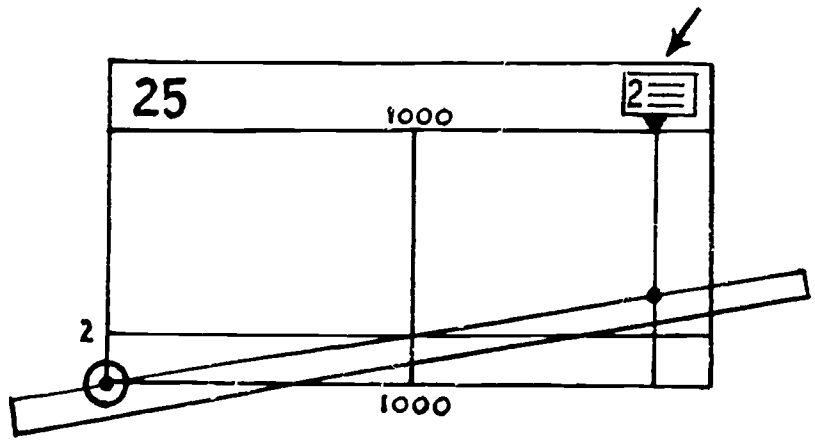



Step 3 Align a straight edge with the point found in step 2 and the center of the circle on the lower left hand corner of the nomogram.



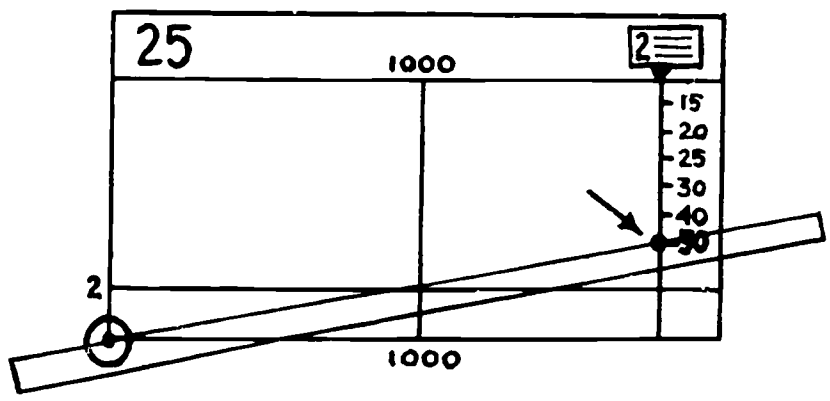
Step 4 Find the vertical line indicating the number of periods the subject is attended per week.

Example: attended 2 times per week




Step 5 Read class size on the vertical line mentioned in step 4 at the point where the straight edge crosses it.

Example: from nomogram - 52 pupils



# APPENDIX B

## Adequacy

The adequacy of a multi-purpose room for any specific curriculum can be quickly determined by using the Castaldi Nomogram. Will a multi-purpose room satisfy the time requirements imposed upon it by the various activities in the educational program for any given enrollment? In order to answer this question, it is necessary to make an analysis of the time distribution among all of the activities intended for this space.

To determine the time occupied by any subject. Divide the number of required teaching stations (to the nearest tenth of a teaching station as read on the Nomogram) by the total number of teaching stations available for that activity, and multiply this answer by the length of the school day.

EXAMPLE:

Given

1. School enrollment: 800
2. School program: 30 periods per week
3. School day: 6 hours
4. Multi-purpose room (two teaching stations with a movable partition) is planned for physical education, hot lunch and assembly.
5. Enrollment in phys. ed.: 800
6. Periods per wk. in phys. ed.: 2
7. Class size in phys. ed.: 40
8. Hot lunch occupies 1 1/2 hours (three shifts for 800 pupils)

Time distribution of these activities.

Physical education = $\frac{1.5}{2}$ (from Nomogram) x 6 = 4 1/2 hours (available)

| | |
|---|---|
| Cafeteria (hot lunch) | 1 1/2 hours |
| Assembly | 0 hours |
| Total | 6 hours |

COMMENT: It is concluded, therefore, due to lack of time for school assemblies, that the above mentioned multi-purpose room is inadequate. It does not serve the purposes for which it was intended.

# APPENDIX C

## Fractional Utilization of Secondary School Spaces

It is frequently necessary to determine what fractional part of the available time in school day or school week will be needed for instructional purposes in a specific subject requiring the use of a given special secondary school space. For example, assuming an educational program of a 30 instructional period week (6 periods per day) and an average class size of 30 pupils, what fraction of the school day or school week will a science room be used for teaching general science, if 100 pupils will take the subject 3 times per week? According to the Castaldi Nomogram, this room will be used 40% (.4 on the nomogram) of the time on a daily or weekly basis for general science. Theoretically, assuming 100% pupil station utilization, it can be shown that this room is needed for the teaching of general science only about 30% of the time, but in actual practice a figure of 40% would be more realistic, since it is a well established fact that secondary school spaces cannot be scheduled at a pupil station utilization factor of 100%.

### How to Determine Fractional Utilization of Spaces with The Castaldi Nomogram

Step 1.

Find the number of teaching stations required for the given subject under consideration as described in pages 4 to 9.

Step 2.

a. If this reading is less than 1, then it corresponds to the fraction of time this space is used for the teaching of the subject in question (assuming an 80% pupil station utilization factor).

For example, a reading of .4 for any given space means that this space is used 40% of the school day or school week for teaching the given subject.

b. If this reading (step 1 above) is greater than 1, simply neglect the whole number preceding the decimal point.

For example, a reading of 2.3 for the teaching of mathematics indicates that 2 rooms will be devoted the teaching of mathematics full time plus the use of a third room 30% of the time.

Note: For gymnasiums with two teaching stations (including gymnasiums with the movable partitions), divide the reading on the Castaldi Nomogram by 2 in order to obtain the fraction of time that the gymnasium is used for physical education.

## A Brief Statement of Purposes and Objectives of the New England School Development Council

NESDEC, as the Council is known, is a voluntary and cooperative association of New England school systems that have joined together for study of common problems and have dedicated themselves to the constant improvement of public education.

The purposes are being met through the combined action of teachers, laymen, administrators and board members from NESDEC school systems by conferences, publications, consultant services and research. NESDEC committees for the more detailed study of common problems grow out of the needs and interests of members.

## New England School Development Council

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| Office | Name | Community |
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| General Secretary | Alfred D. Simpson | Harvard University |
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| Harlan E. Atherton | Concord, N.H. |

## New England School Development Council
## Membership Listing as of Oct., 1953

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Harold G. Norton

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Ralph W. Proctor

Canton
John Glenn

Dover
Benjamin O. Thomas

Essex
Frank Lawler

Foxborough
Charles G. Taylor

Gardner
Frank C. Chace

Haverhill
T. Joseph McCook

Ipswich
Robert F. Savitt

Lynn
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Marblehead
Aura W. Coleman

Melrose
Harold T. Rand

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Derwood A. Newman

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Arthur J. Mott

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Salem
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Irvin D. Reade

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Westwood
Edmund W. Thurston

West Springfield
Stanley W. Wright

Weston
Calvin E. Gross

Weymouth
Elmer S. Mapes

## New Hampshire

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William C. Sterling

Enfield
Howard F. Mason

Henniker
William C. Sterling

Lyme
Howard F. Mason

Newbury
William C. Sterling

Warner
William C. Sterling

Claremont
F. Lester Trafton

Exeter
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Hopkinton
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Howard F. Mason

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Harlan E. Atherton

Hanover
Howard F. Mason

Lebanon
Hammond A. Young

Nashua
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Sutton
William C. Sterling

Webster
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